



Armed Forces College of Medicine

AFCM



Lymph node & Spleen

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Professor of Histology

INTENDED LEARNING OBJECTIVES (ILO)



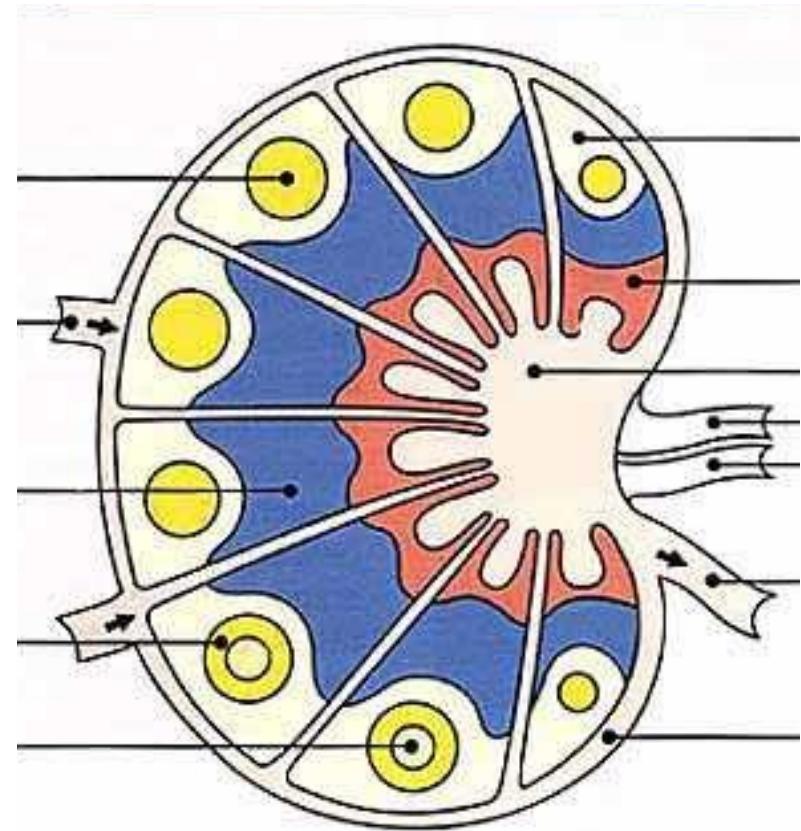
- **By the end of this lecture you should be able to:**
 - 1. Describe the structure of the lymph node**
 - 2. Correlate the structure of the lymph node to function.**
 - 3. Appreciate the structure of the lymph node in certain diseases.**
 - 4. Describe the microscopic structure of spleen (the white pulp).**
 - 5. Identify the thymus-dependent zone of the spleen**

Lymph Node



- **Small, encapsulated & ovoid or bean-shaped**
- **Convex surface**
penetrated by afferent lymphatic vessels.
- **Concave surface (Hilum):**
 - vessels entering and leaving,
 - lymph leaves via efferent lymphatic vessels

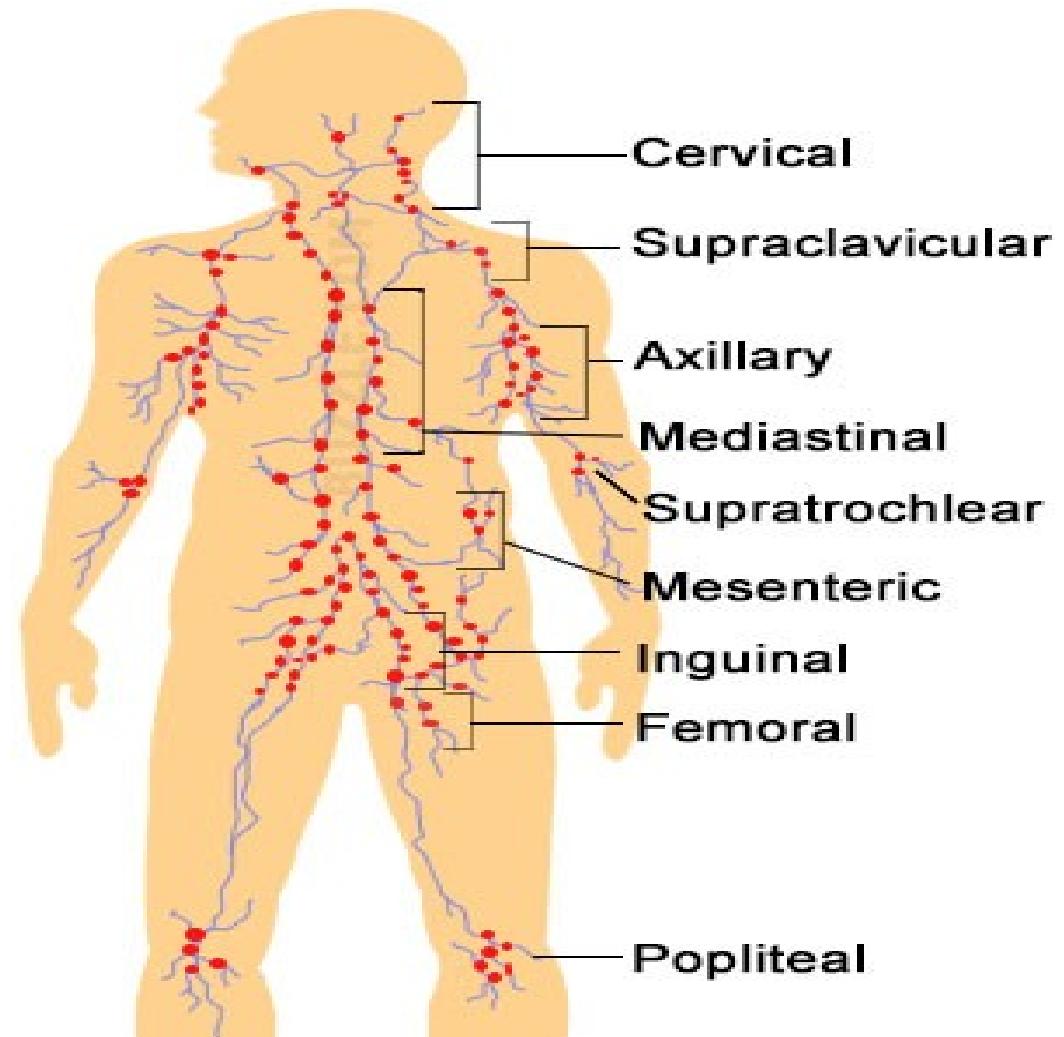
Valves



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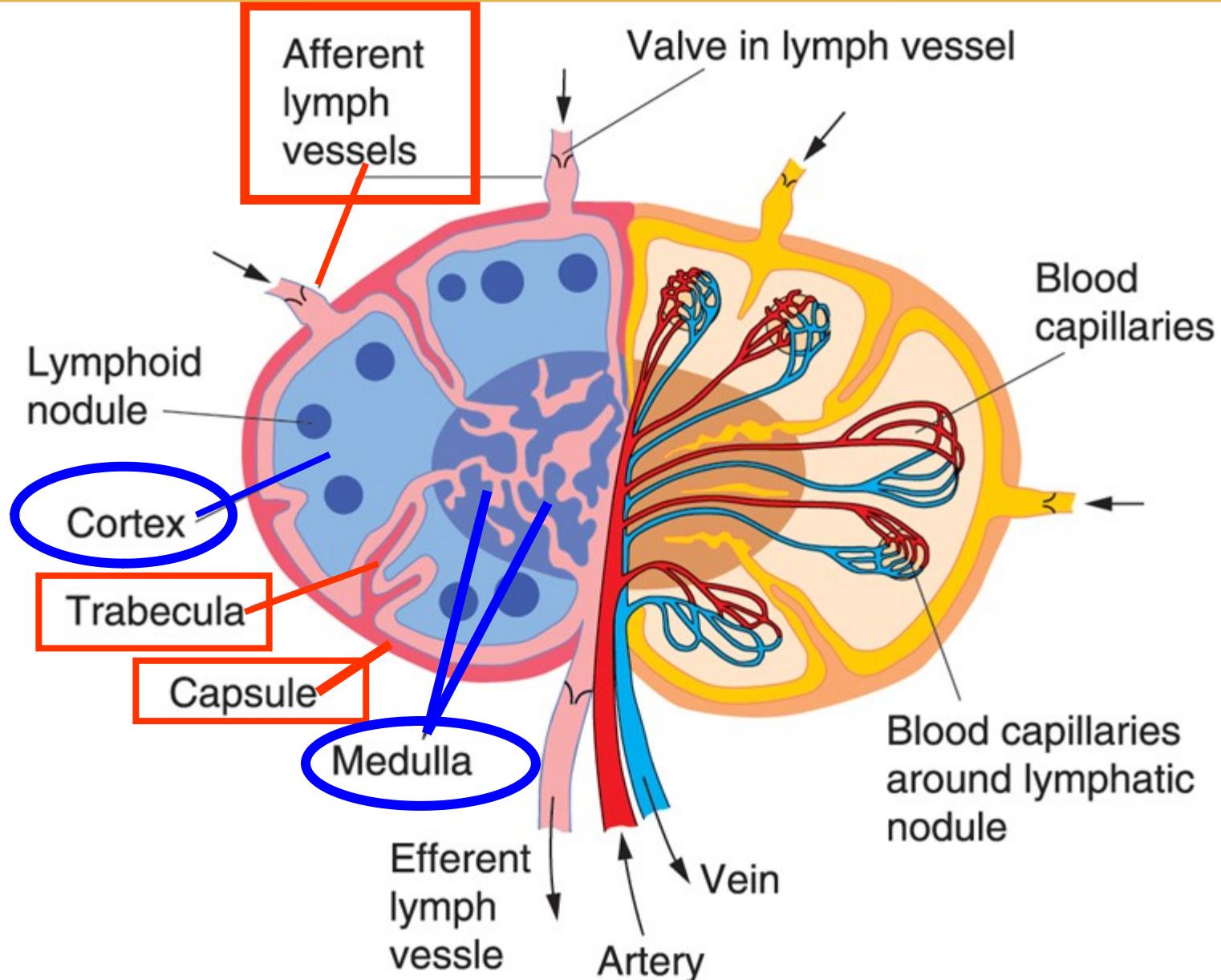
Where are lymph nodes located

Present along the course of lymphatic vessels to filter the lymph





Lymph Node

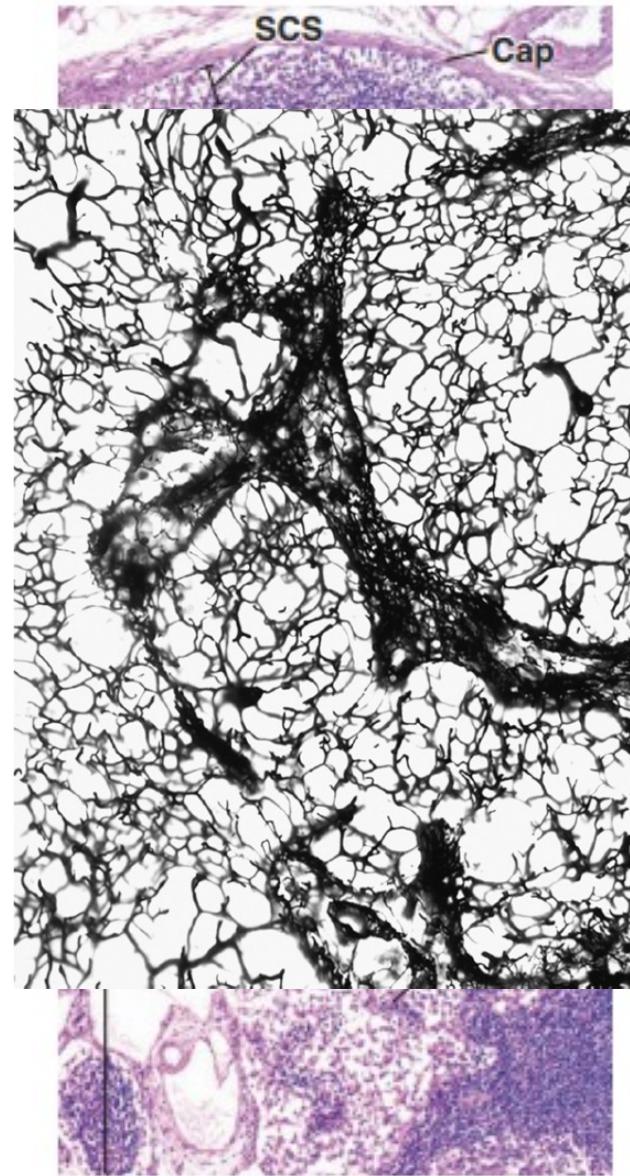


Lymph Node



Stroma:

- 1. Capsule:** dense irregular C.T.
- 2. Trabeculae: septa** arising from the deep surface of the capsule divide the lymph node into **incomplete compartments** while in the medulla they branch and anastomose.
- 3. Reticular C.T:** network of reticular cells and fibers. (**silver**)



Lymph Node -Parenchyma



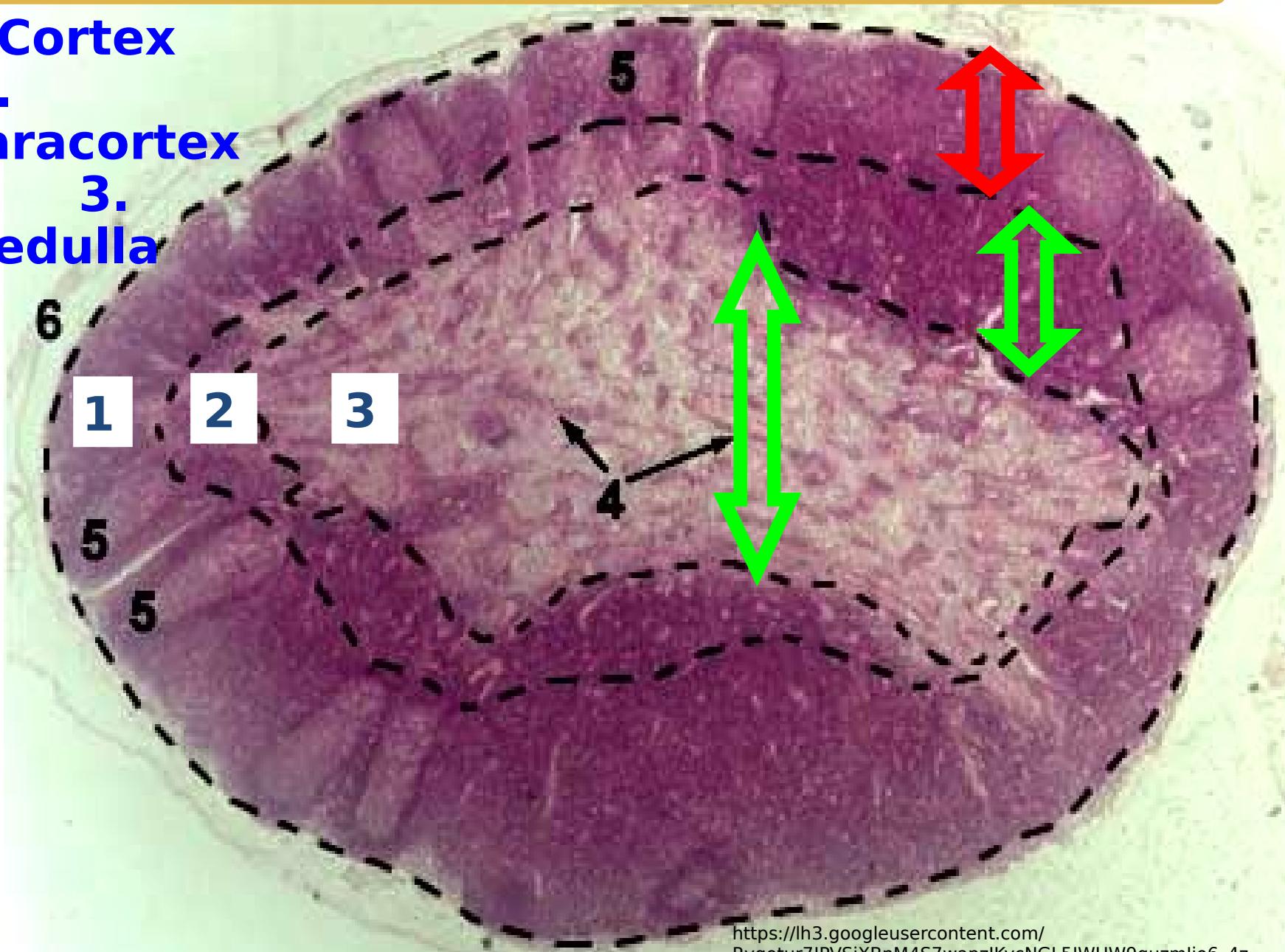
1. Cortex

2.

Paracortex

3.

Medulla



1-Cortex of the Lymph Node



A-Lymphoid Nodules

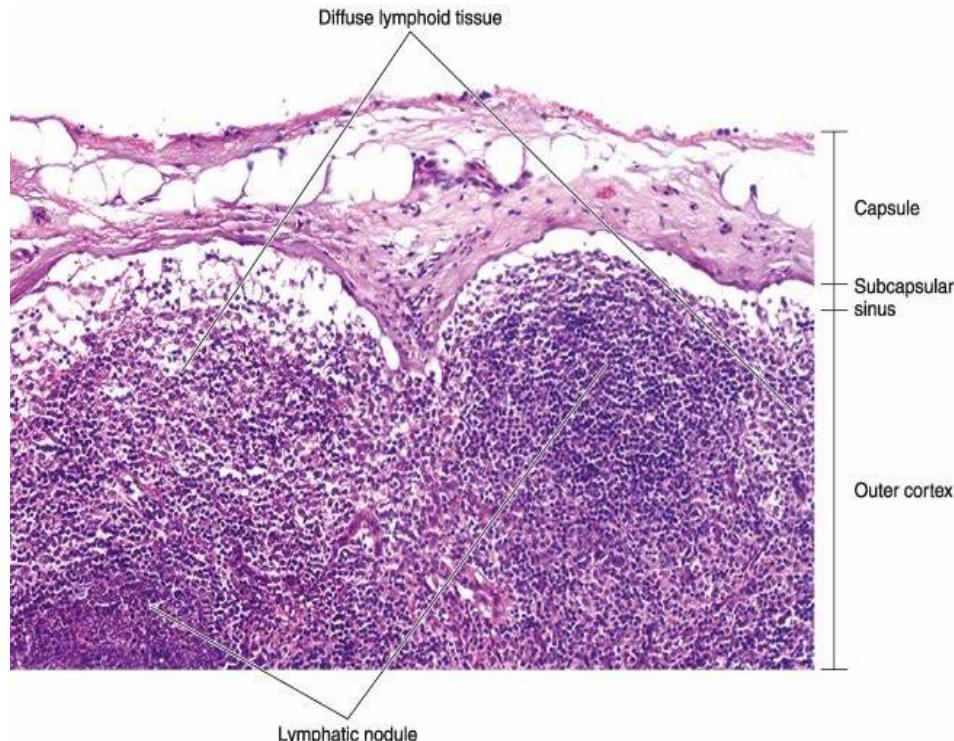
They are aggregation of lymphocytes under the capsule.

Types:

1-Primary:
homogenous

2-Secondary: Dark periphery and pale central region→
(germinal center)

B-Cortical lymphatic sinuses



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Cortex of the Lymph Node



A-Lymphoid Nodules

Types:

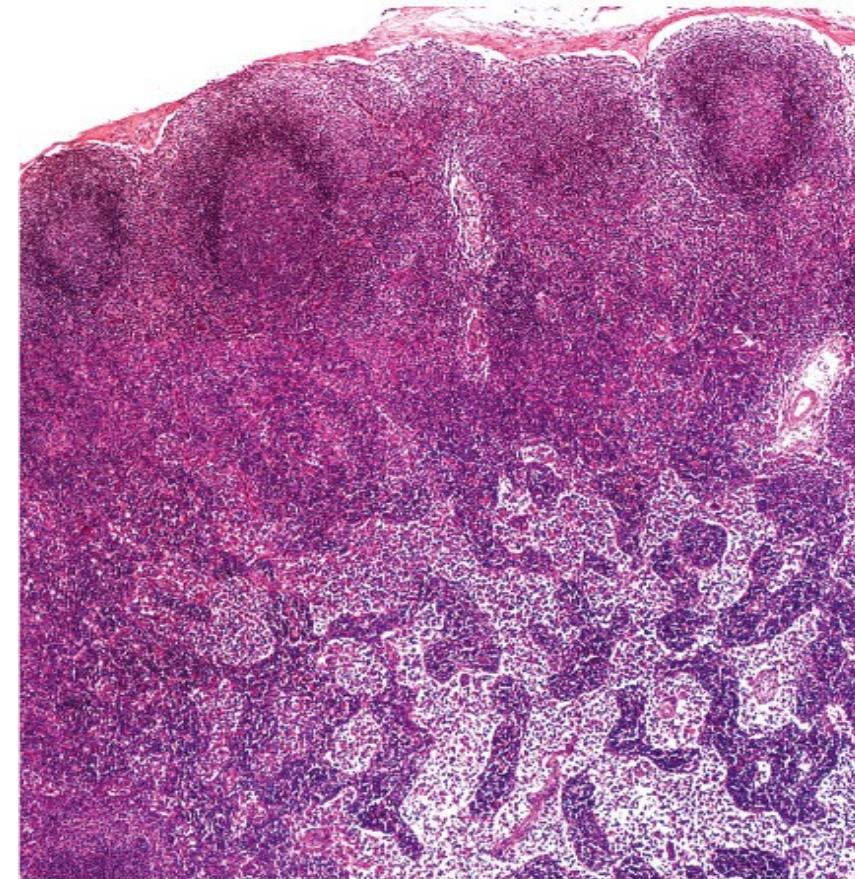
1-Primary:

homogenous

2-Secondary: Dark periphery and pale central region→

**~~(germinal center)~~
What are the cell present
in the Germinal center?**

**Activated B lymphocytes,
T-helper,
Macrophages,
Plasma cells
Dendritic cells**



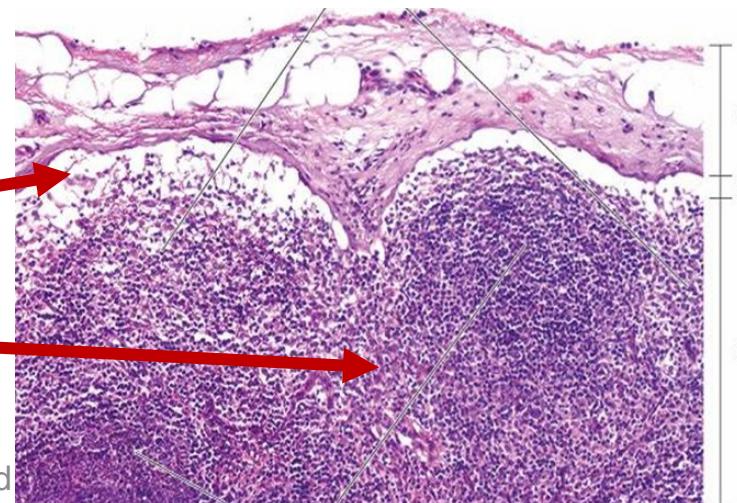
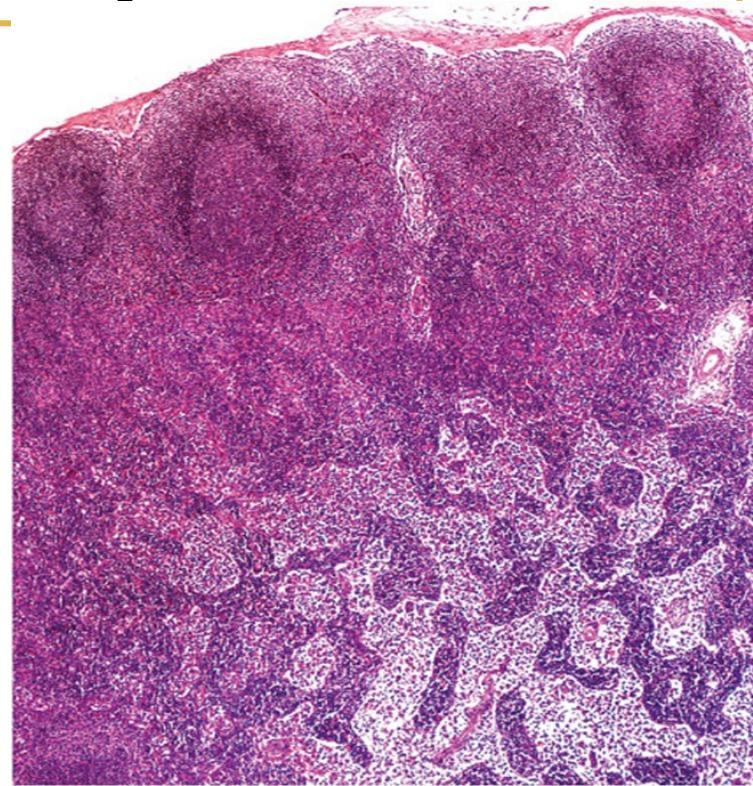
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Cortex of the Lymph node

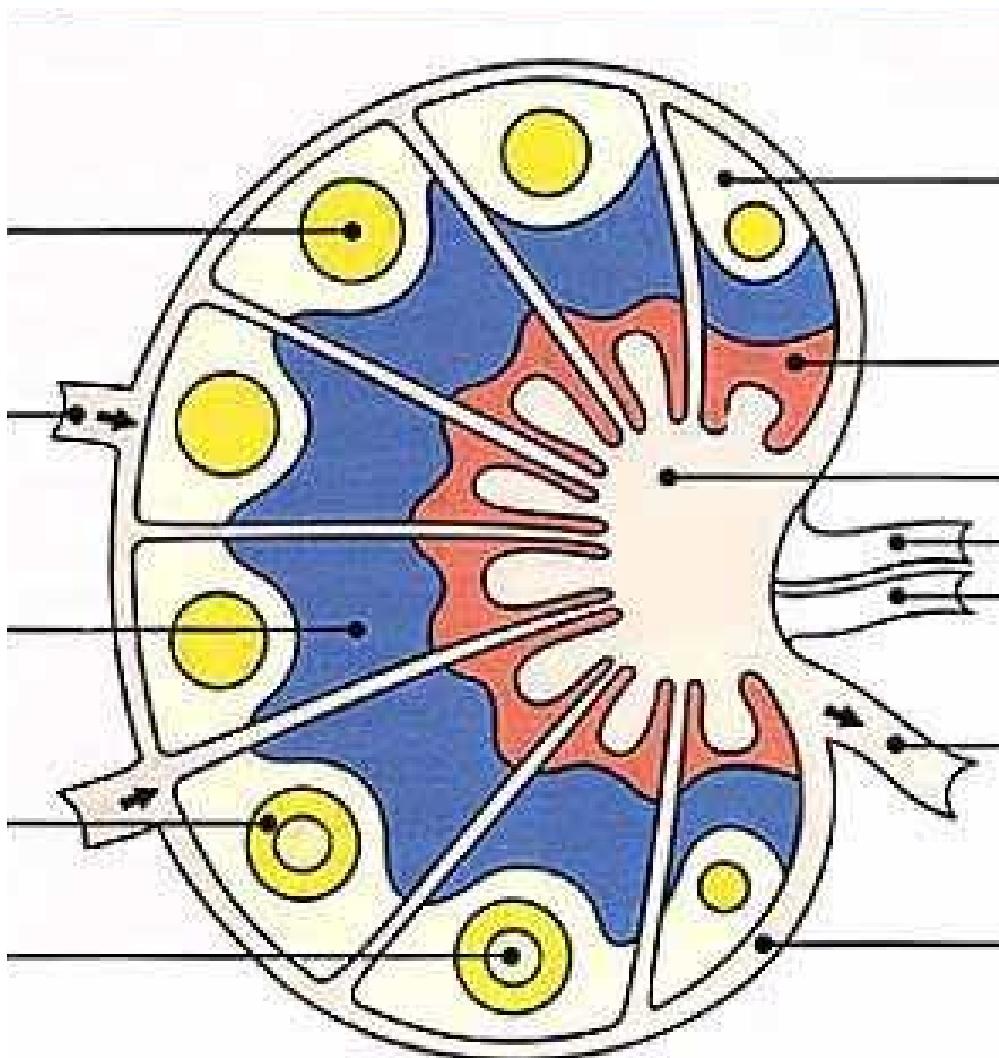


B- Cortical lymphoid sinuses

- They are spaces filled with lymph surrounding the lymphatic nodules and trabeculae.
- They are lined by endothelial cells and partially by reticular cells and macrophage.
- Subcapsular sinus
- Cortical & Paracortical sinuses



Lymph Pathway in Lymph Node



Afferent
lymphatic

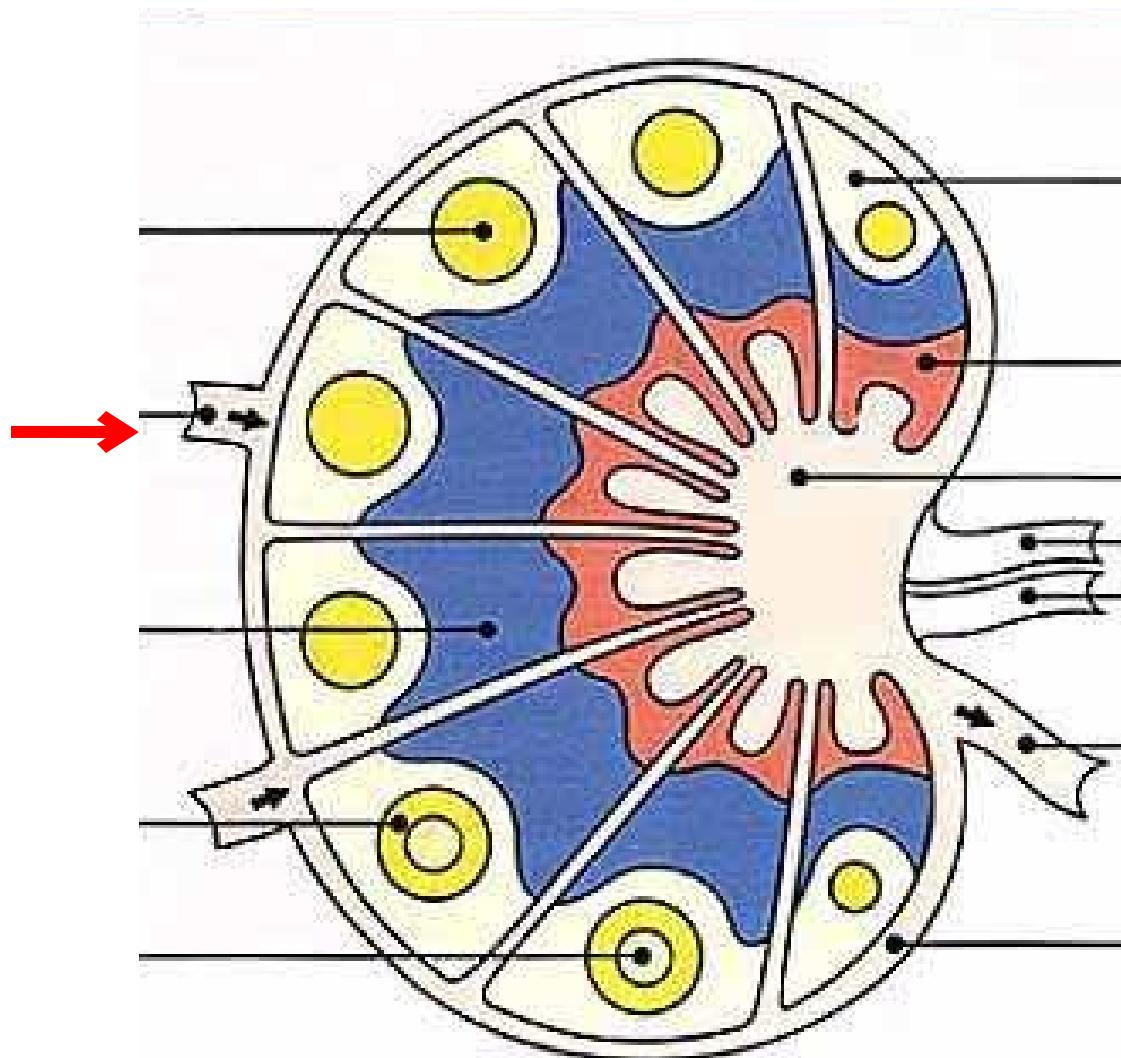
Subcapsular
sinuses

Cortical and
trabecular
sinuses

Medullary
sinuses
(in medulla)

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Lymph Pathway in Lymph Node



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Paracortex of the Lymph node



□ It is present between the cortex and medulla.

□ Characterized by:

1- Thymus-dependent area
(Numerous T lymphocytes)

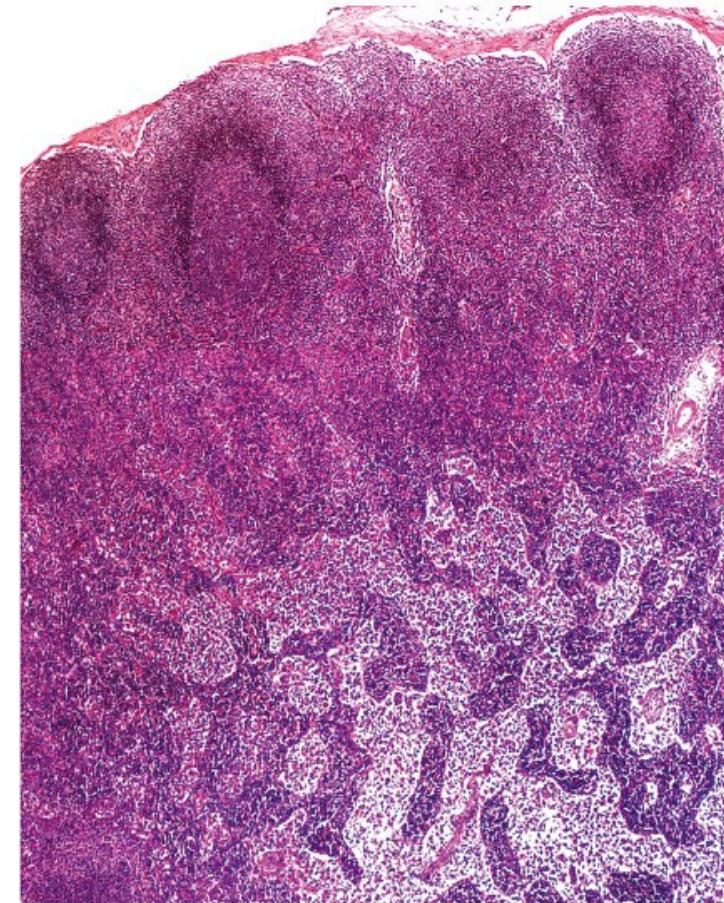
2- High endothelial post capillary venules

B lymphocytes
cortex

T lymphocytes
cortex

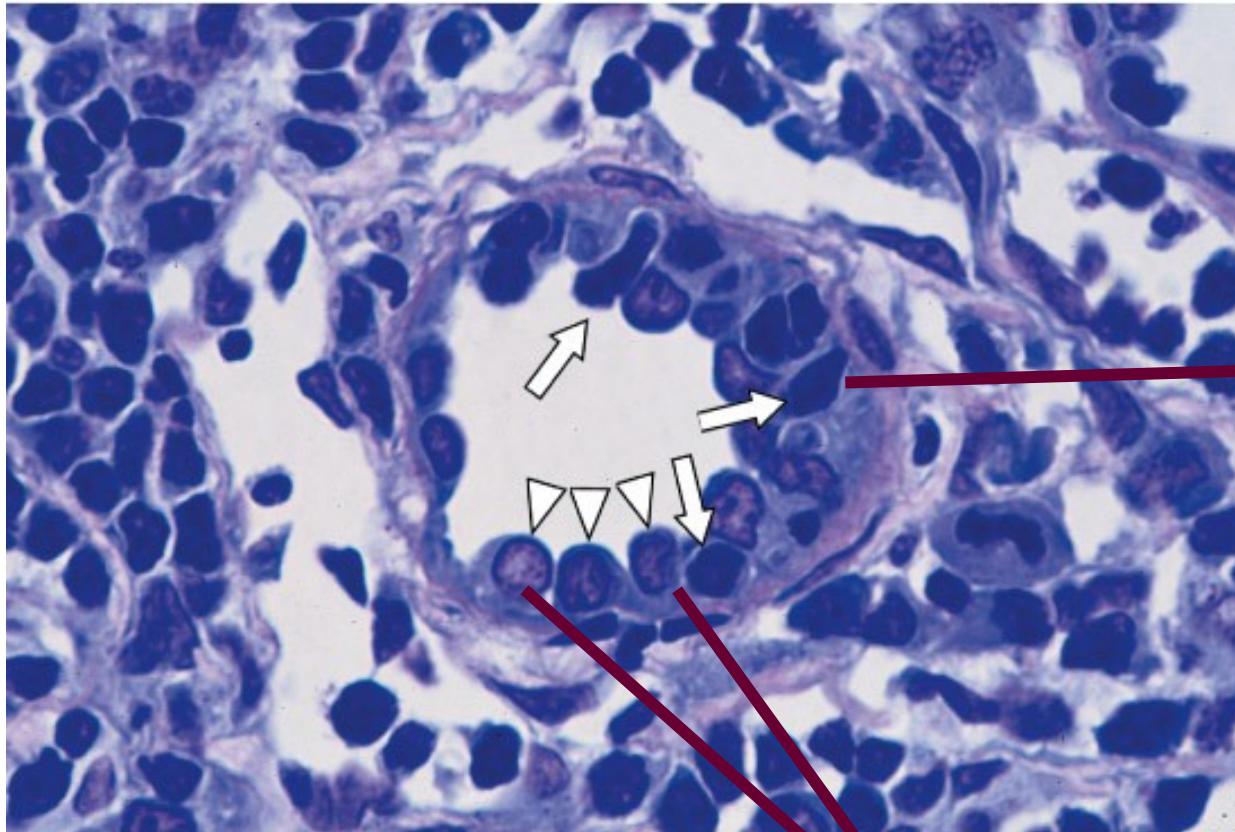
outer

para



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Lymph node-Paracortex



High endothelial post capillary venules where lymphocytes leave blood and enter the lymph node between the high endothelial cells

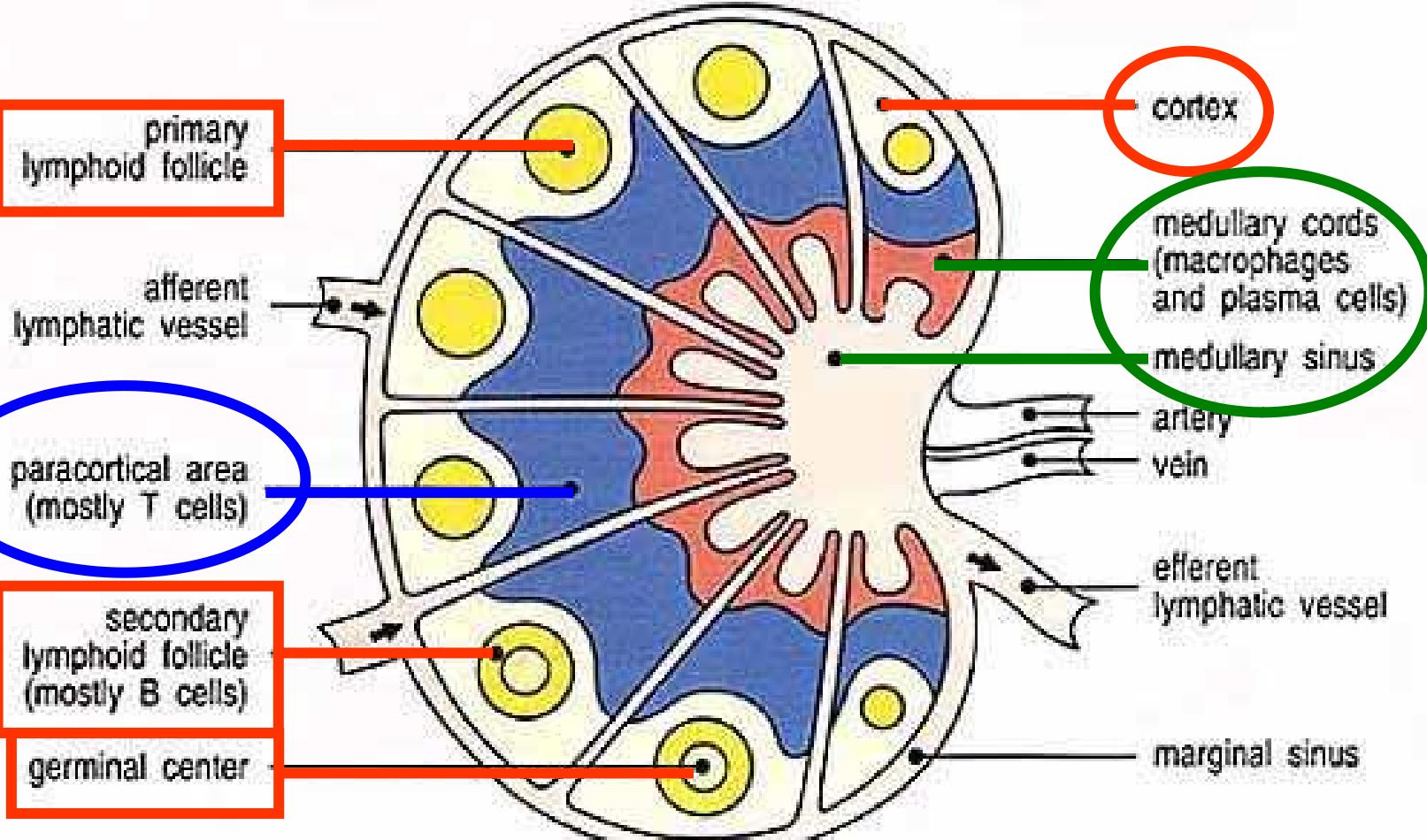
High endothelial cells

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Lymph node-Paracortex



The lymph node



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Lymph node-Medulla



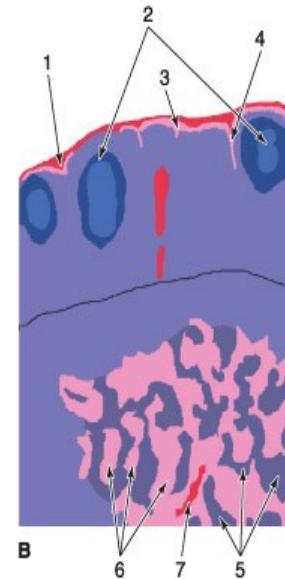
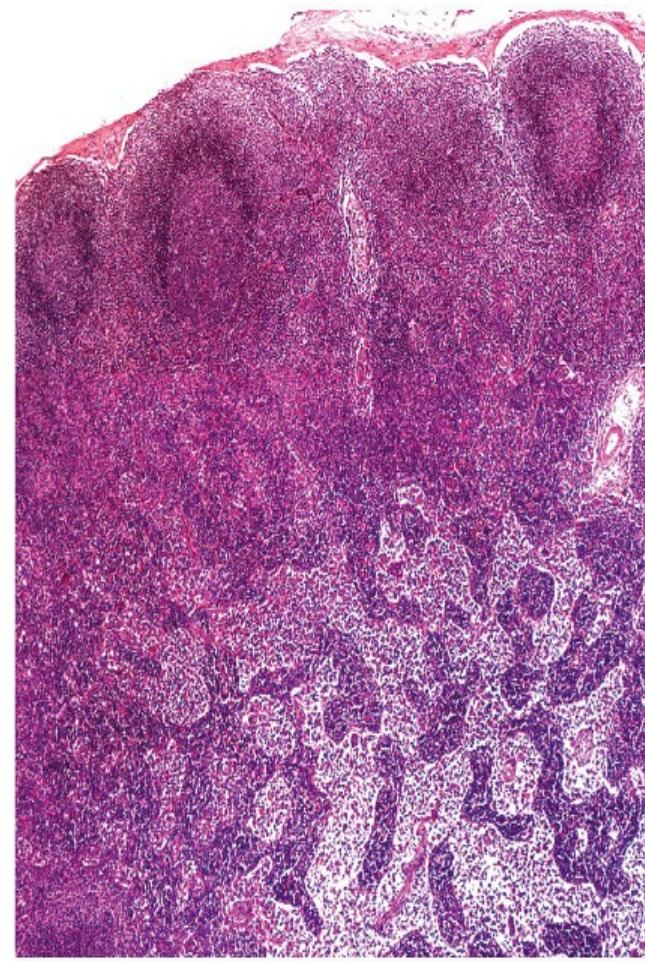
- It is surrounded by the cortex except at the region of the hilum

- It is composed of:

A- Medullary cords (cells)

- Branch and anastomose
- Separated by medullary sinuses
- B lymphocytes, T lymphocytes, plasma cells and macrophages.

B- Medullary sinuses

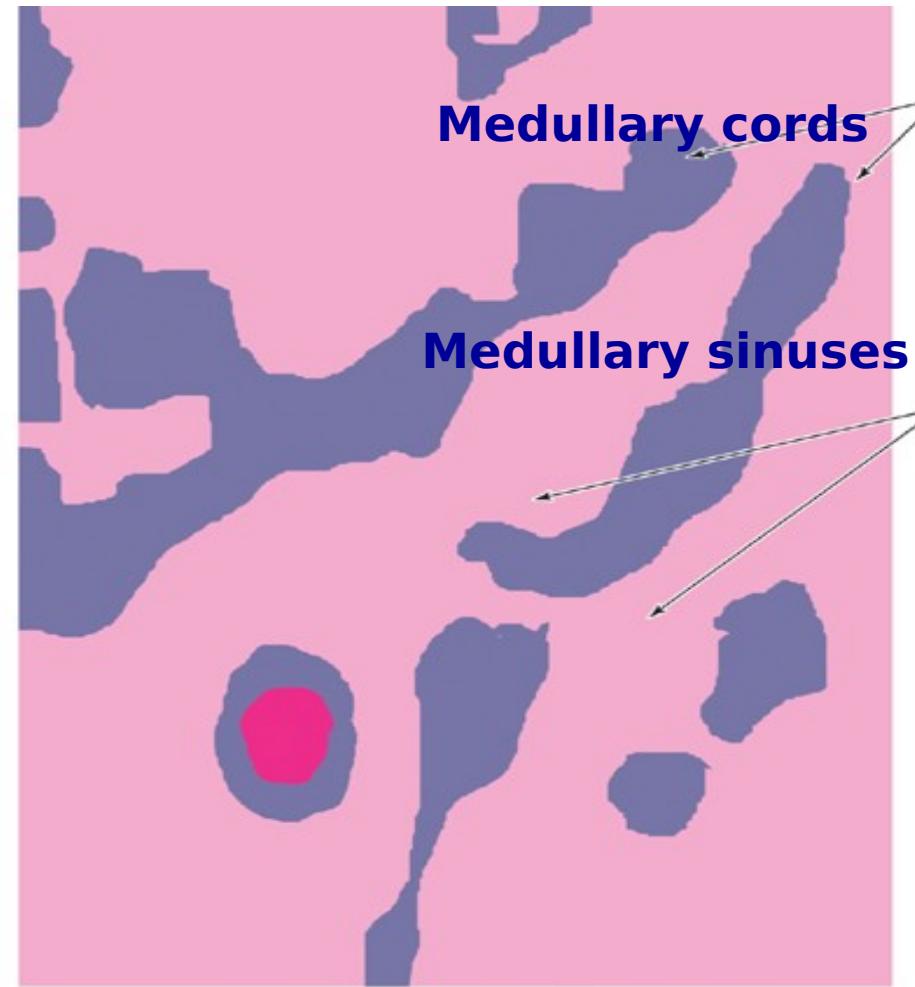
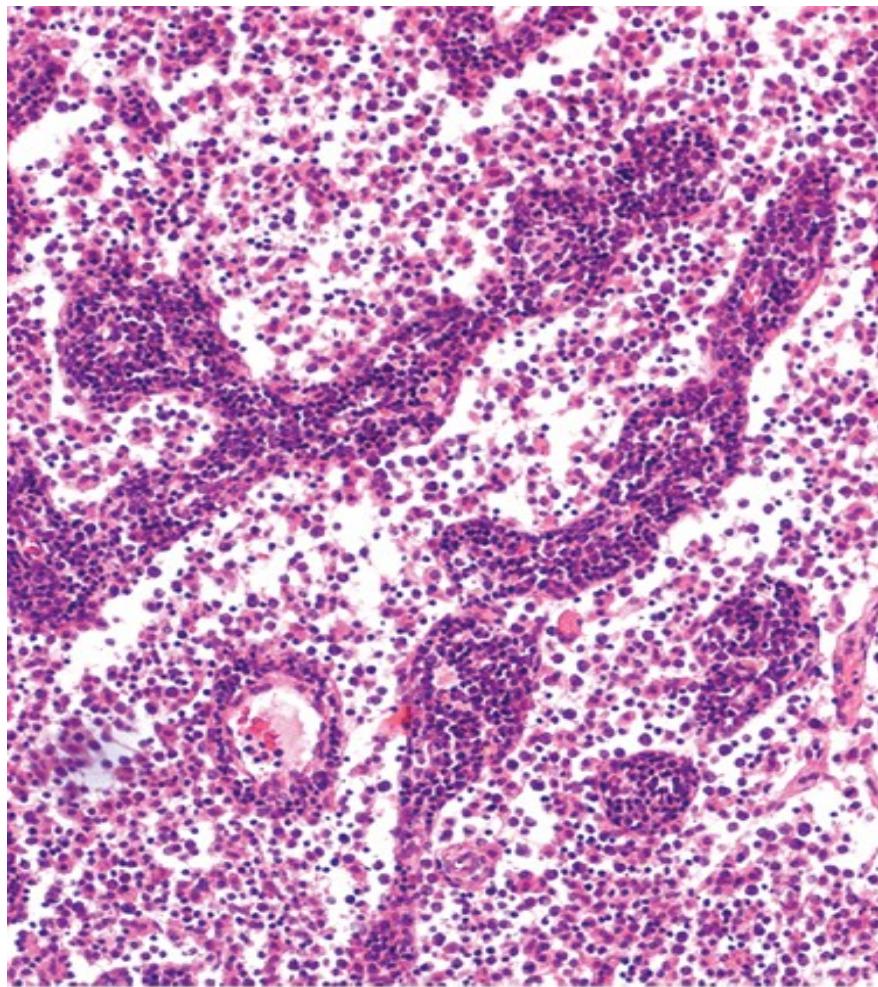


A

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Medulla of the Lymph node



A

B

Lymph node



Test



1. Cortex, 2. Paracortex, 3. Medulla, 4. Medullary cords, 5. Lymphatic nodules



Functions of the lymph node

➤ Filtration of lymph

About 99% of the antigens carried by the lymph from any organ or tissue are phagocytosed by the macrophages present in the lymph node.

➤ Humoral immune response

➤ Cell mediated immune response

➤ Maintain and produce B and T lymphocytes

Medical application

- **Infection** leads to enlargement of LN.
- **In cancer**, malignant cells will reach the LN then spread to distant organs





Question



- Lymphocytes leave the blood to enter the lymph node through

High endothelial postcapillary venules

Question



The paracortex of the lymph node :

- A- is composed mainly of T-lymphocytes
- B- is considered the thymus dependent area of lymph node
- C- has many high endothelial post-capillary venules
- D-all of the above



High endothelial post-capillary venules :

- A-are present in the paracortex of the lymph node
- B- are the site where lymphocytes leave the blood to enter the lymph node
- C are lined by high cubical cells
- D- all of the above

Question



- **High endothelial venules in the lymph node are present in:**

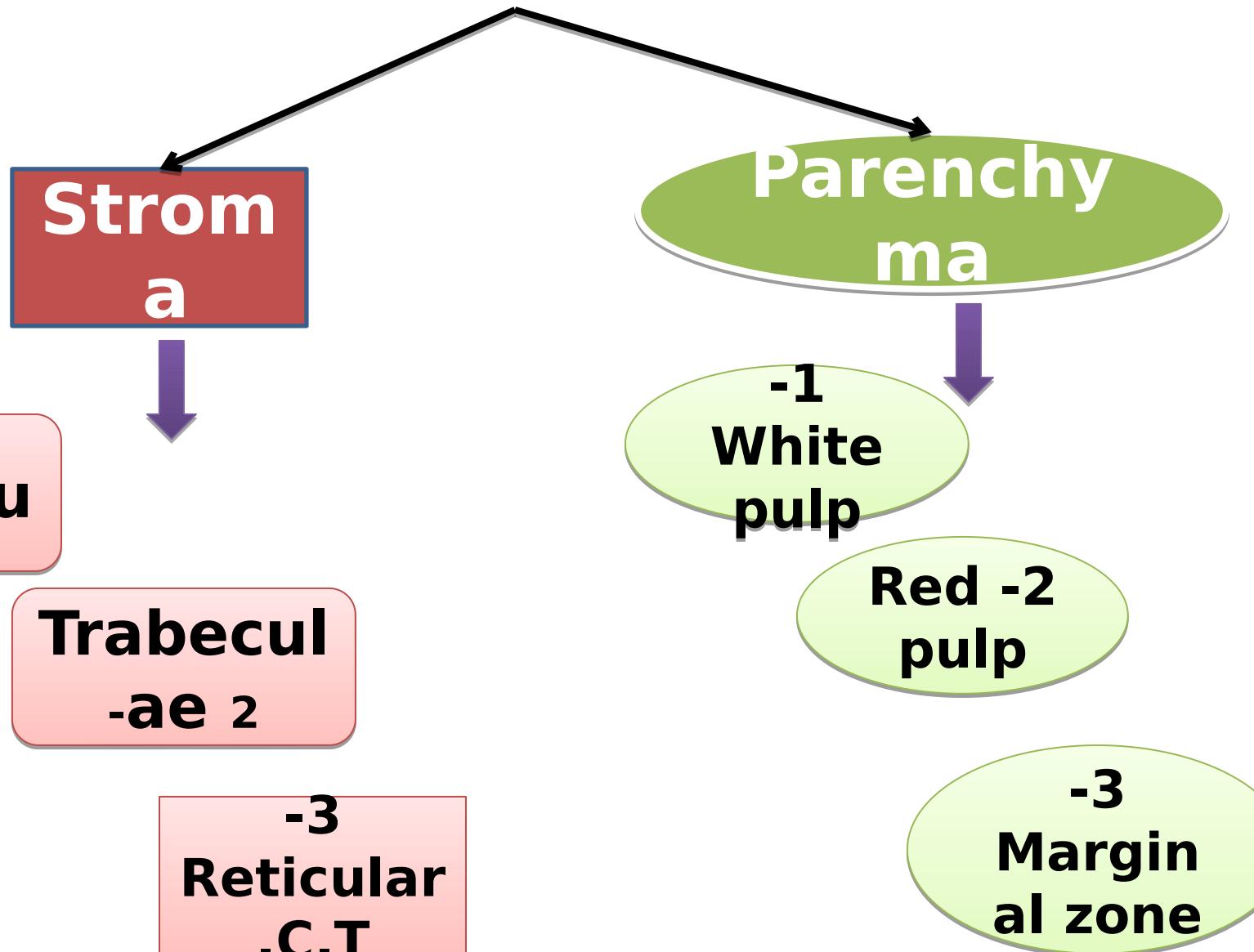
1. Outer cortex
2. Medulla
3. Deep cortex
4. Marginal zone

The Spleen



- **It is the largest lymphatic organ**
- **Differs from lymph node as:**
 - **It is Not divided into cortex and medulla**
 - **No afferent lymphatics**
 - **It filters blood (not lymph)**

The Spleen



The Spleen



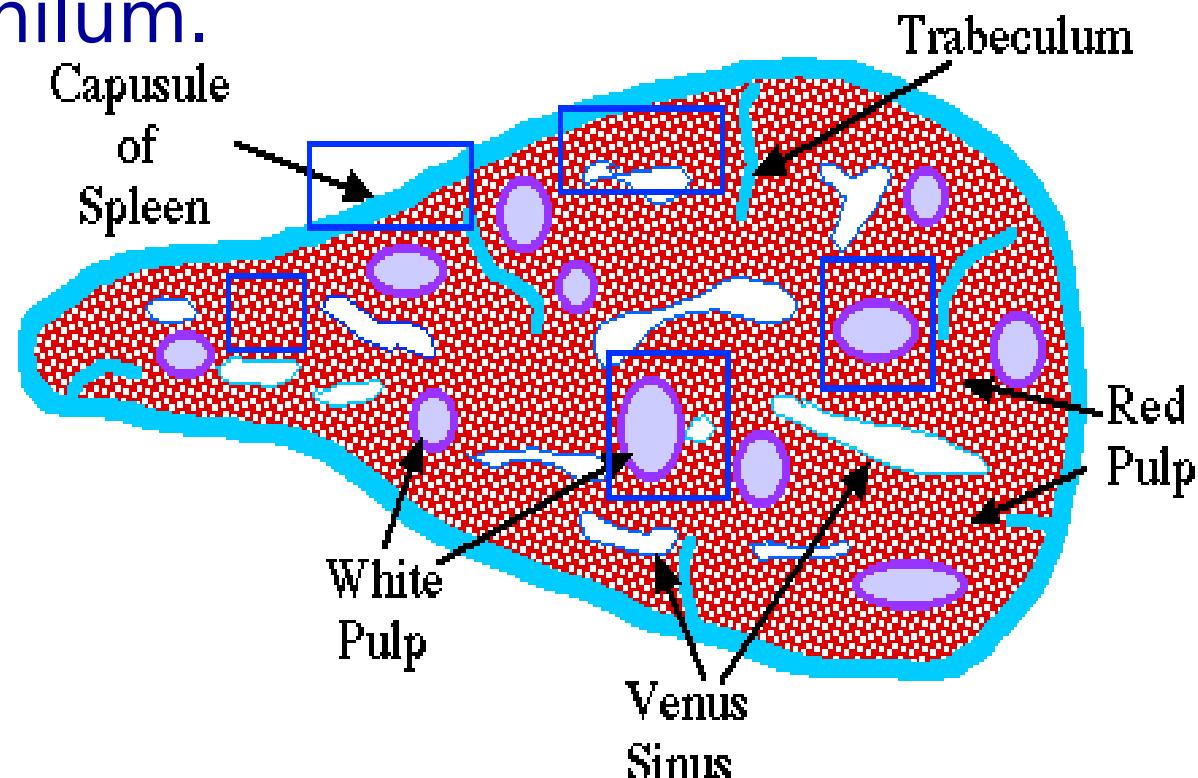
A. Stroma

1. Capsule

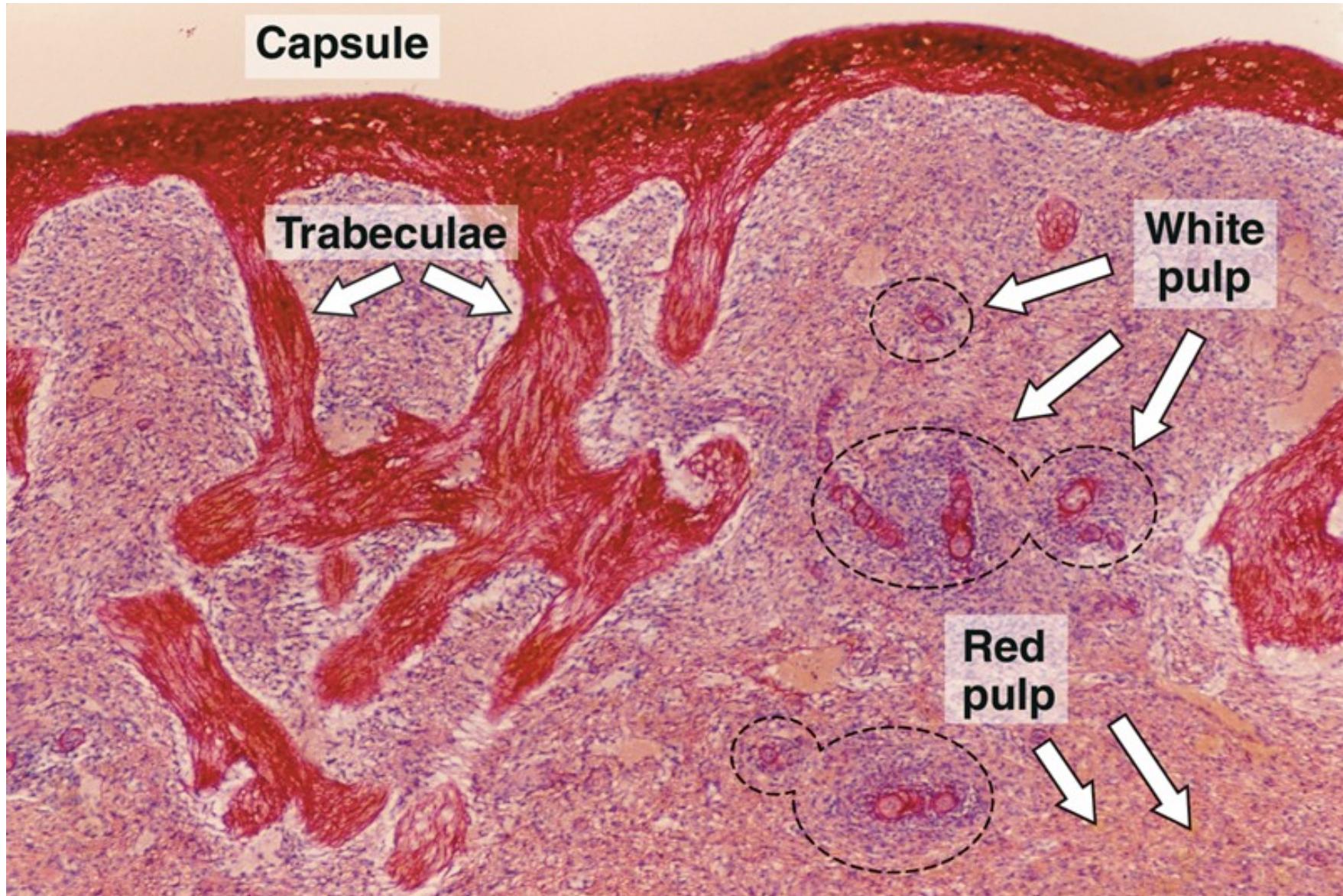
-Formed of C.T. fibers, fibroblasts, and smooth muscle fibers. -Covered by **peritoneum** and thickened at the hilum.

2. Trabeculae

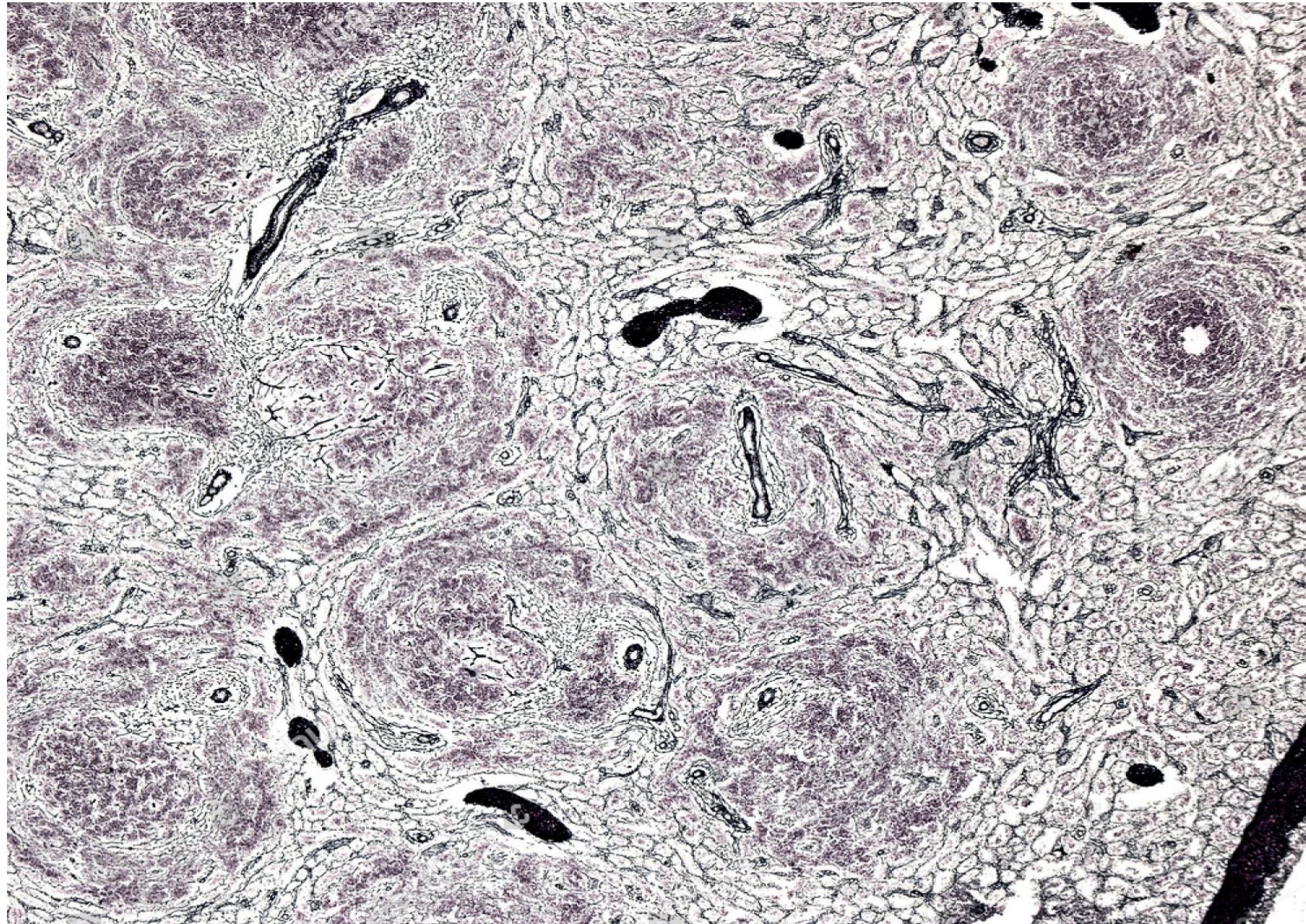
3. Reticular C.T.



The Spleen

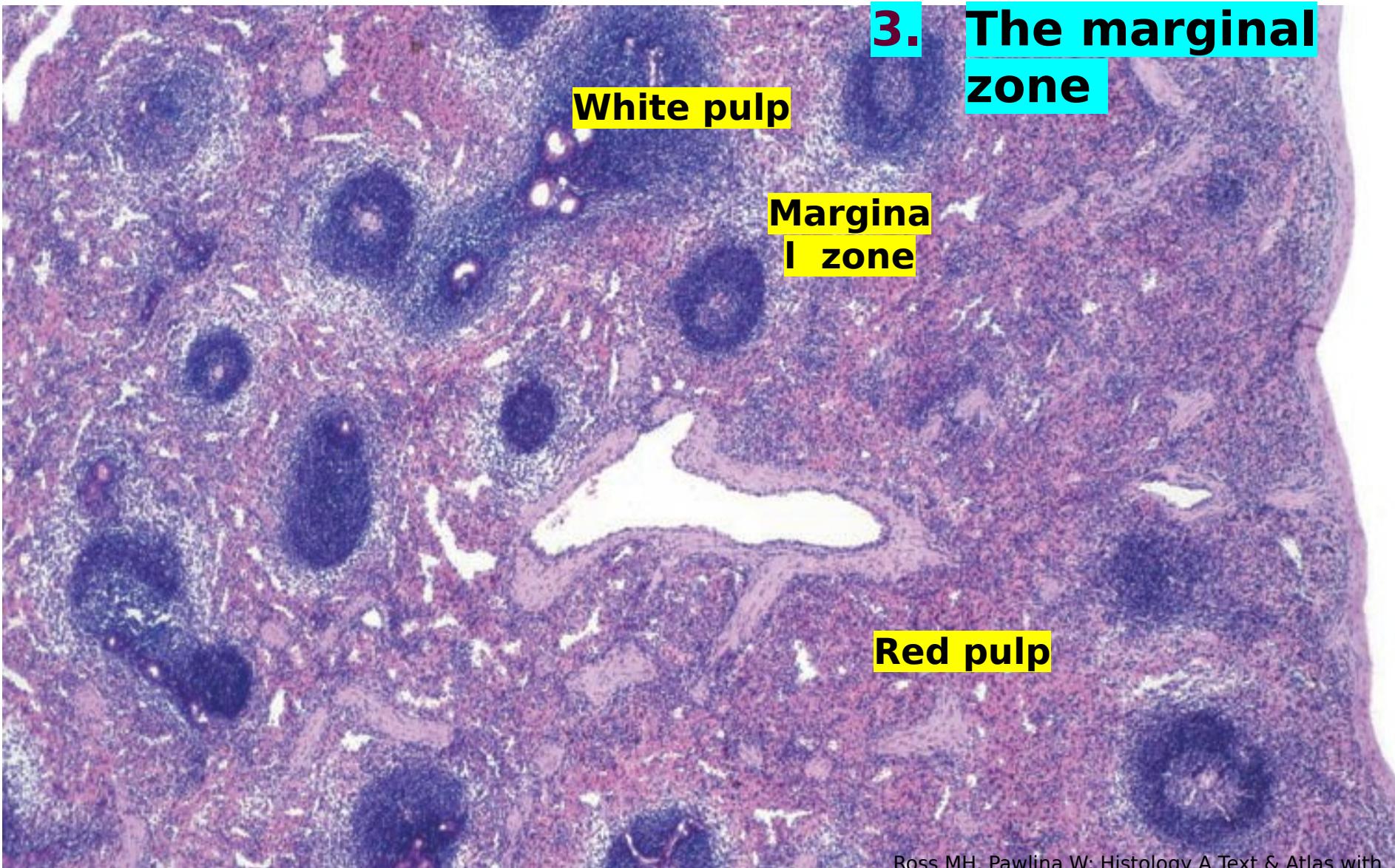


The Spleen-Reticular CT (silver)



The Spleen-Parenchyma

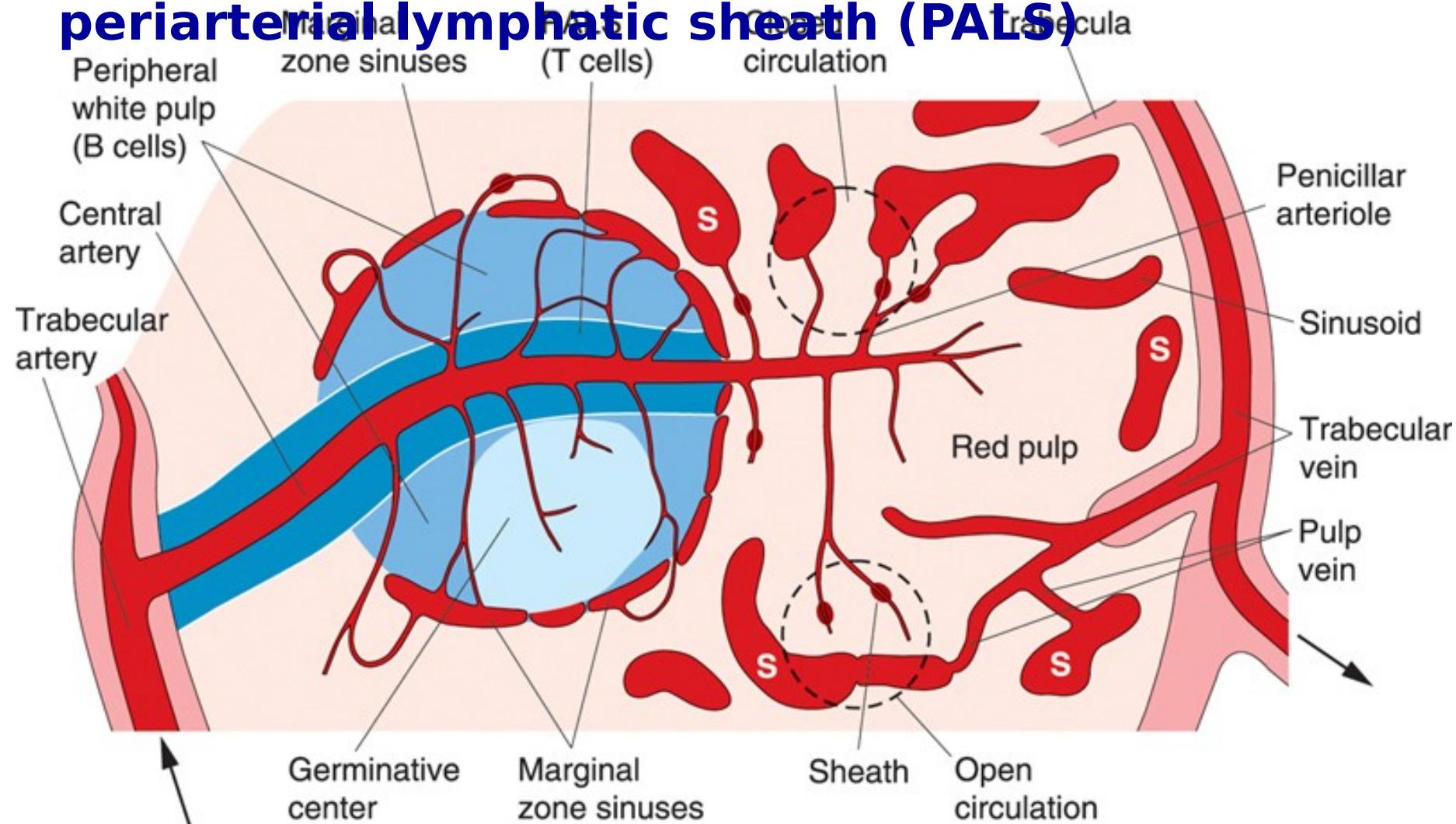
1. The white pulp
2. The red pulp
3. The marginal zone



The Spleen



- **Splenic Artery** → **trabecular arteries**
central artery which becomes covered by
periarterial lymphatic sheath (PALS)



The Spleen- 1-The white pulp



- **Consists of lymph nodules traversed by central (follicular) arteries. Usually they are secondary with germinal centers.**
- **It is formed of 2 major parts:**

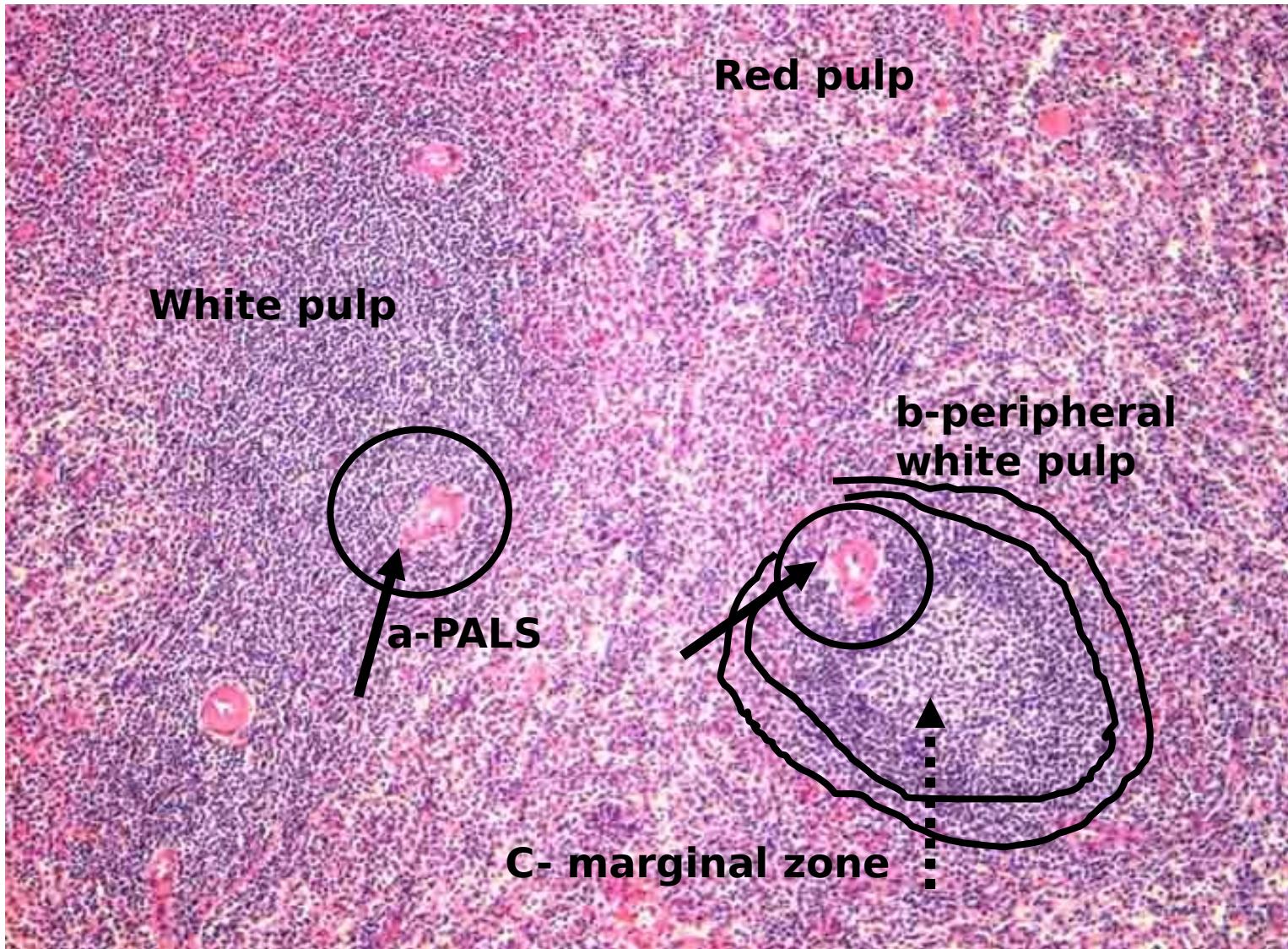
Periarterial lymphatic sheath (PALS)

Lymphoid tissue immediately surrounding the central artery and is formed of T-lymphocytes **(Thymus-dependent zone)**

Lymph nodules (Peripheral white pulp)

Lymphoid tissue surrounding the PALS, formed of B-lymphocytes, macrophages and Ag presenting cells, may have germinal centers

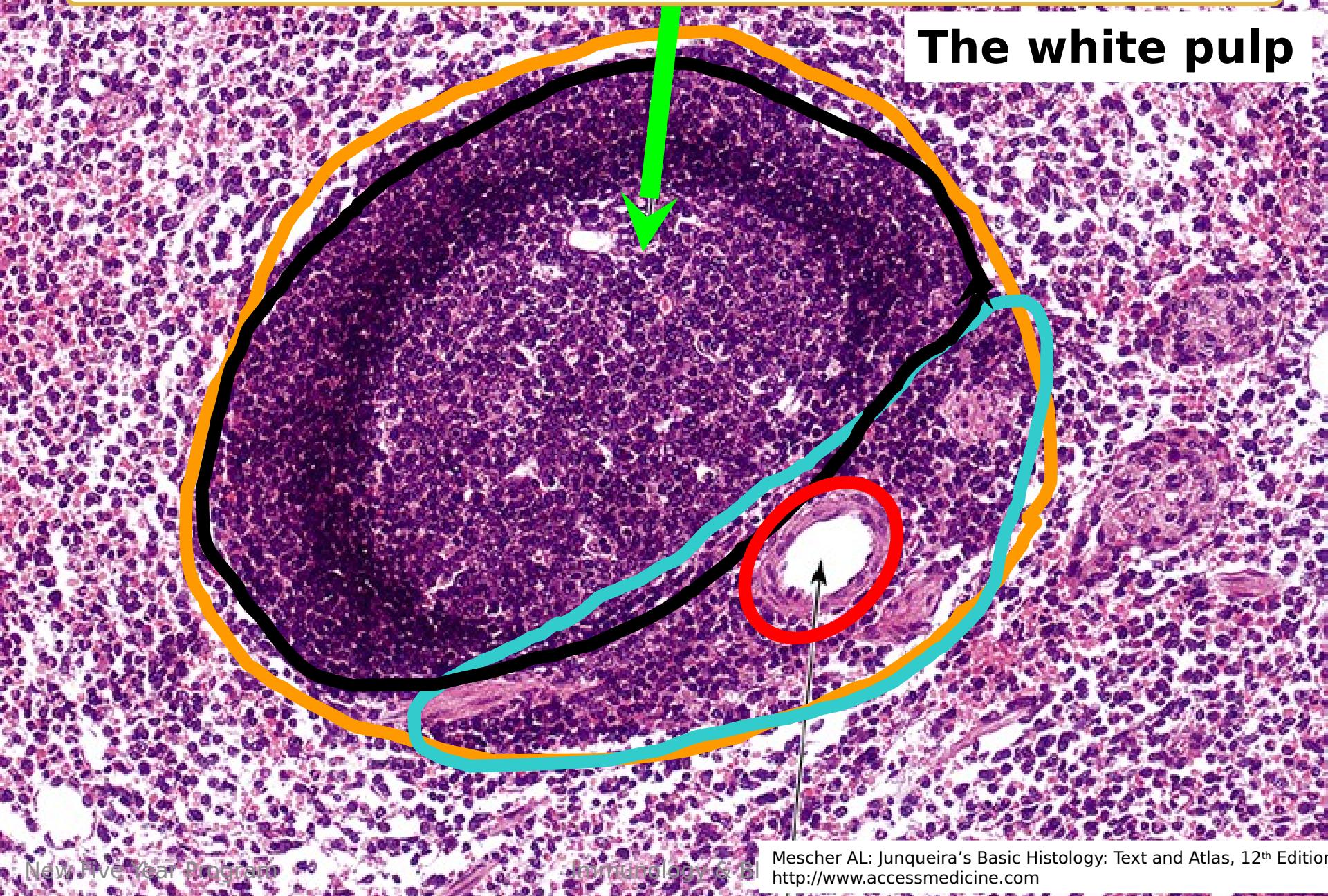
The Spleen



The Spleen



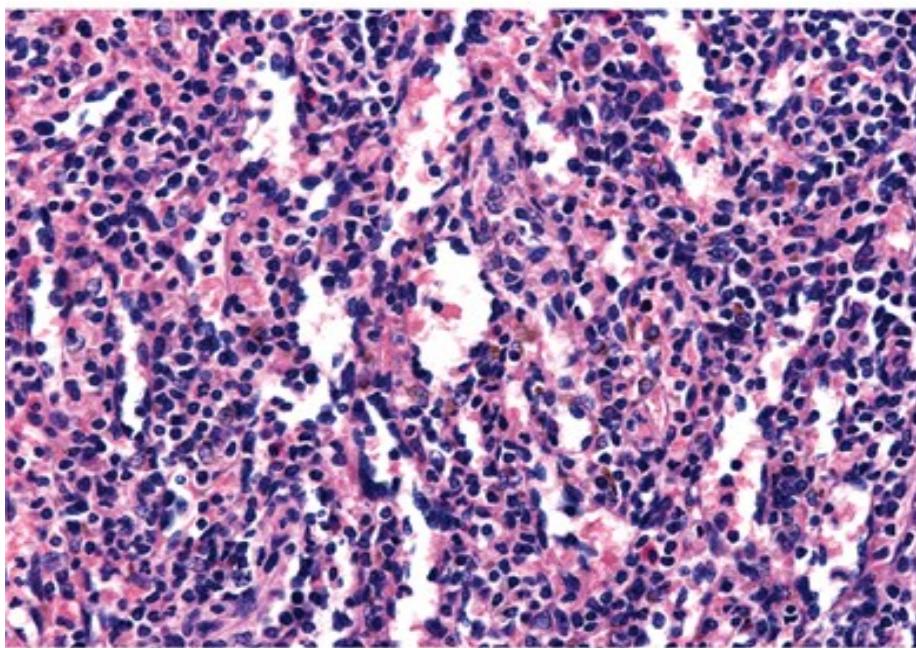
The white pulp



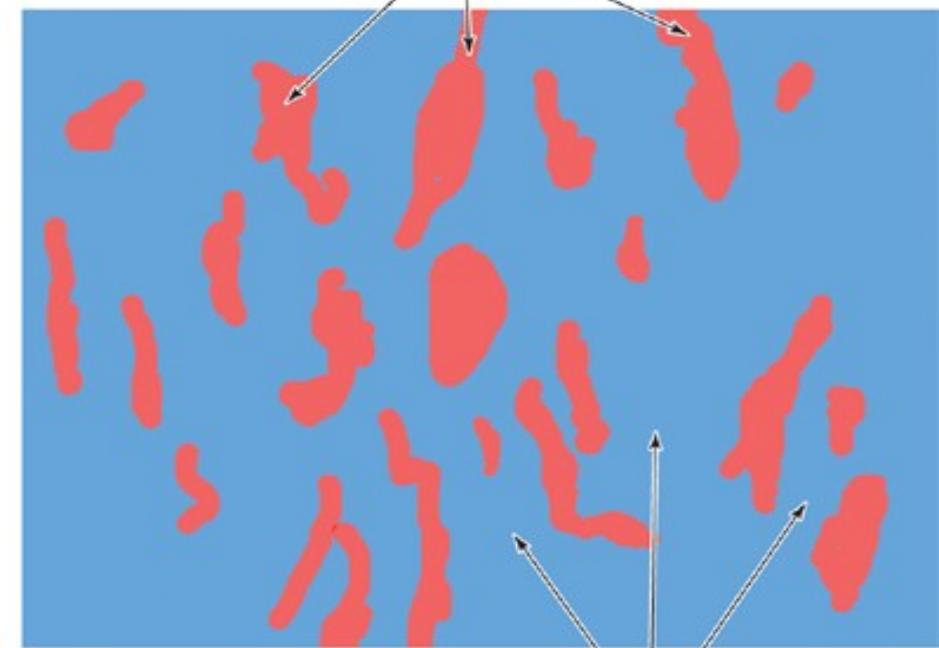
The Spleen



2-The red pulp: **Splenic sinusoids** **Splenic cords**



A



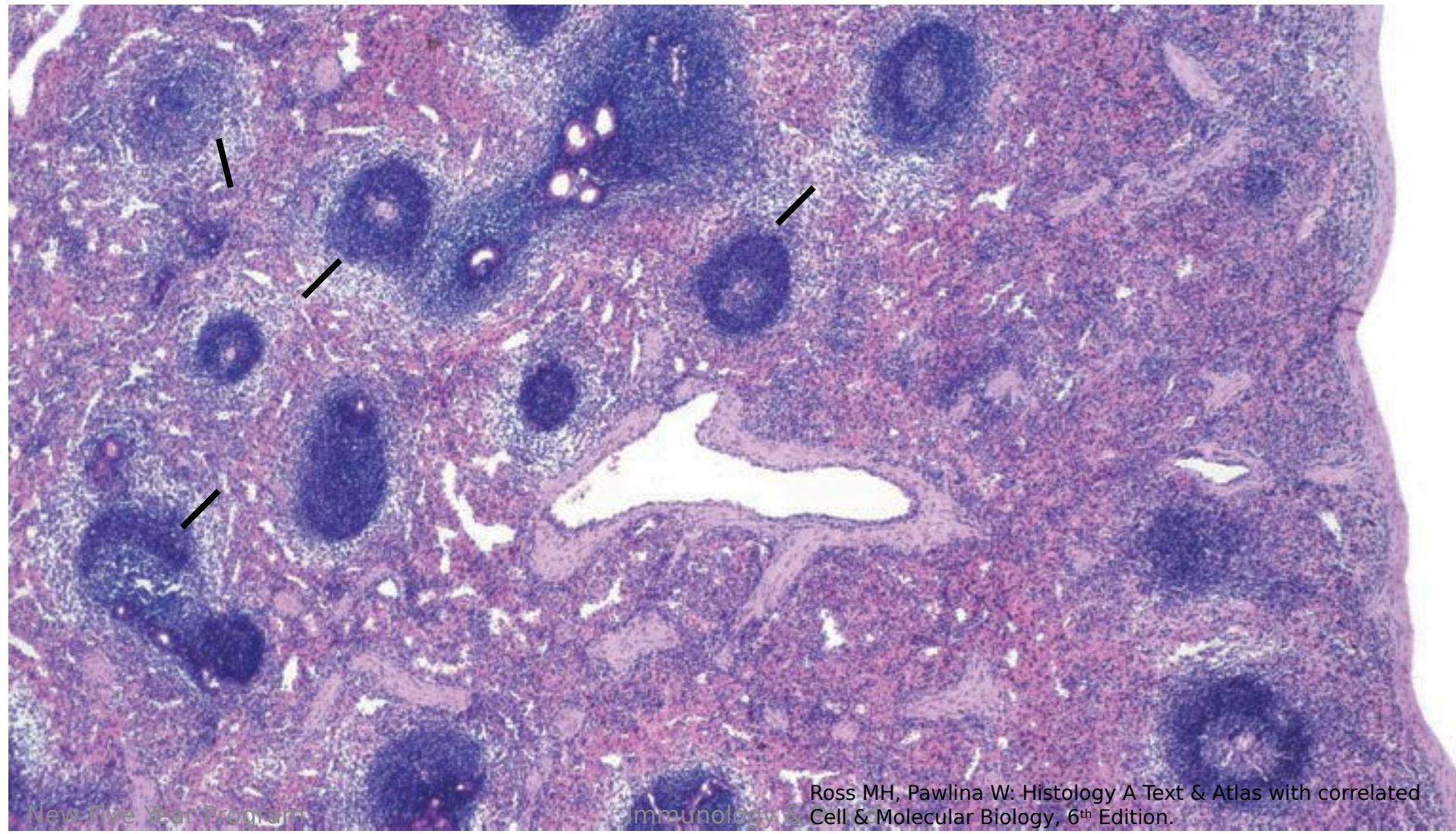
B

<https://lh3.googleusercontent.com/CAgejMn3btYlVoKAH8CyBqh0oTl6CkjPYTat0BuHE3trDoqnO8NUvg5csm70ozU-qml=s170>

The Spleen



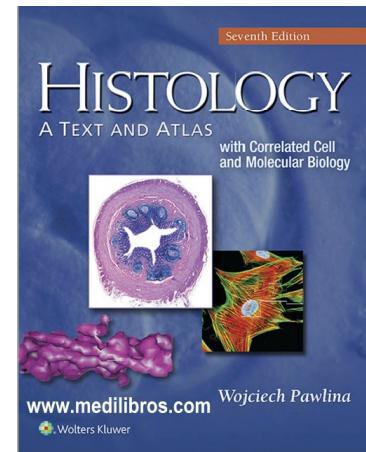
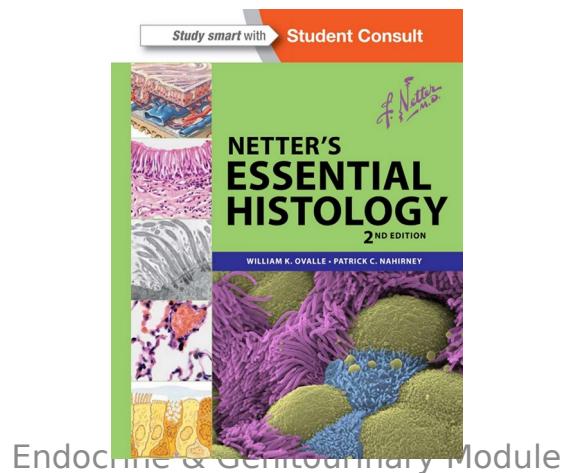
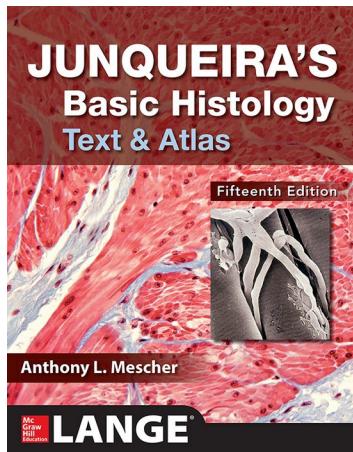
The marginal zone-3



SUGGESTED TEXTBOOKS



1. **Junqueira's Basic Histology: Text and Atlas, 16th Edition by Anthony Mescher, 2018.**
2. **Michael H. Ross & Wojciech Pawlina (2024), Histology Text and Atlas with correlated cell and Molecular Biology, 7th Edition.**





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